SPECIFICATION AMENDMENTS

Please amend the specification as follows.

2. Please replace paragraph 10 with the following.

[0010] Fig. 1 illustrates a hemofiltration apparatus employing the present invention. Blood flows from the patient 100 through an arterial line 102a and returns blood to the patient via a venous line 102b. Waste is drawn through a waste line 104B from a treatment device 106 (conventionally, a filter) and sent to a disposal channel 116. The removal of waste 104 tends to reduce the volume of the blood so a balancing mechanism 108 restores this volume before returning the blood to the patient by adding replacement fluid to a venous line 102b. The balancing mechanism 108 maintains hydrostatic balance by adding precisely the same quantity of replacement fluid from a replacement fluid container 115, offset by a desired net ultrafiltrate prescribed for the treatment. Commonly, the excess over perfect fluid balance is drawn through an ultrafiltrate line 104B via a separate pump 114 under control of the controller 104.

2. Please replace paragraph 11 with the following.

[0011] The control 104 may also control the balancing mechanism directly without need for a separate ultrafiltrate line 104B by biasing the balancing mechanism such that the net ultrafiltrate volume is achieved over the course of treatment. These options are illustrated by control signal lines 115A and 115B. The data used to perform such ultrafiltrate control may be stored internally by means of a memory (not shown) for a programmable processor-based controller (not shown) or by means of a mechanical configuration (also not shown) adjusted before treatment. To further refine its ability to control ultrafiltrate levels, the control 104 may also adjust an effective control point responsively to a model of fluid balance error as a function of a measurable quantity, such as venous pressure, for example as measured by means of a pressure sensor 116A sending a continuous output signal 116B to the controller. The volume of replacement fluid 115 sent to the patient 100 can then be reduced or increased as indicated by the model.

3. Please replace paragraph 13 with the following.

[0013] The ultrafiltration pump 208 functions as a partial bypass of the circuit that includes waste balancing chambers 212, 214, diverting waste before it displaces replacement fluid 222 to be sent to the patient, thereby reducing the volume of replacement fluid sent to the patient. This results in a net loss of fluid volume from the patient. As will be recognized by those of skill in the relevant arts, the above is one of a variety of different mechanisms. The repeated operation of valves and pressurization of fluid chambers attending the operation of such a balancing mechanism may cause cumulative error in the fluid balancing when conditions vary. For example, if a high-pressure head is experienced in the replacement fluid line, the displacement efficiency of the apparatus may be diminished or otherwise altered depending on materials and other design details.

4. Please replace paragraph 31 with the following.

[0031] Referring to Fig. 7, a variety of inputs may be applied to network model 800 and the model 800 trained or otherwise programmed to combine these signals into a compensation signal E using the feedback of a calibration process exemplified by the sample process described above. Inputs that may affect the performance of the balancing mechanism include: fluid properties 805 such as density or conductivity 810 pressure or differential pressure, both indicated at 812, an audio signature (frequency spectrum where each frequency channel may be an independent component of the entire input vector) 814, fluid velocity 816, fluid temperatures or temperature rise (both indicated at 818) through the balancing mechanism, pump motor shaft torque 820, pump motor current draw 822, and others.